

PhD Fellowship (f/m/d) at the Interface of Organometallic Chemistry and Radiochemistry:

Exploring the π -Alkyne and π -Alkene Chemistry of Technetium

Research institute	Institute for Nuclear Waste Disposal (INE), Karlsruhe Institute of Technology (KIT)
Doctoral affiliation	KIT Department of Chemistry and Biosciences
Location	KIT Campus North, Eggenstein-Leopoldshafen / Karlsruhe area
Start	As soon as possible, by agreement
Funding period	3 years, fixed term fellowship
Funding	Direct PhD fellowship as part of the project leader's Liebig Fellowship (Fonds der Chemischen Industrie, FCI)

Your PhD project

The organometallic chemistry of the radioactive element technetium remains remarkably underdeveloped. This is particularly evident for π -bound C–C ligands beyond cyclopentadienyl, whose chemistry is much less developed than that of the neighbouring group 7 elements manganese and rhenium. Building on the first structural characterization of stable technetium complexes featuring side-on-coordinated alkynes, this PhD project will systematically expand the π -alkene and π -alkyne chemistry of technetium.

The project combines preparative synthesis, computationally guided ligand design and modern spectroscopy in a closely integrated approach. Calculations will not merely be used for retrospective interpretation; they will actively inform experimental decisions, from selecting and prioritising new ligands to understanding electronic structure, bonding and reactivity.

- Development, synthesis and optimisation of new alkyne, alkene and related π -ligand systems
- Preparative synthesis and reactivity studies of new metal complexes, including technetium compounds
- Systematic characterisation using modern spectroscopic and structural methods, e.g. single-crystal X-ray diffraction, multinuclear/metal-nucleus NMR spectroscopy as well as X-ray absorption and emission spectroscopy
- Presentation of research results at national and international conferences and publication in international peer-reviewed journals
- Contribution to teaching in accordance with the funding conditions of the Fonds der Chemischen Industrie, FCI, e.g. through student supervision

Within the project objectives, the precise scientific focus can be adapted in consultation with the project leader to reflect your interests and strengths. During the PhD, you will have the opportunity to develop further in computationally guided synthesis, ligand design, organometallic chemistry, coordination chemistry and fundamental inorganic chemistry.

Your Profile

We are looking for an experimentally strong chemist with a solid background in preparative chemistry who enjoys solving challenging synthetic problems systematically and combining experimental work with spectroscopic and computational approaches.

- Excellent Master's or Diploma degree in Chemistry or a related field; applicants must meet the requirements for admission to doctoral studies at the KIT Department of Chemistry and Biosciences.
- Willingness to work with unsealed radioactive materials and to handle hazardous chemicals safely
- Solid practical experience in preparative inorganic or organometallic chemistry and first experience with air-free techniques, in particular Schlenk techniques
- Broad interest in modern spectroscopic methods and structural chemistry
- Affinity for computational approaches as an integral part of synthetic planning
- Enthusiasm for solving complex and challenging problems in synthetic chemistry
- Careful, reliable and responsible working style
- High degree of initiative, scientific curiosity, ability to work in a team and very good communication skills

Particularly advantageous are:

- Experience with the safe and independent handling of reactive materials under Schlenk and/or glovebox conditions
- Experience in the synthesis and characterisation of new metal complexes and/or ligand systems
- German language skills
- Initial experience with quantum-chemical calculations, programming (Python) or data analysis
- Previous experience in radiochemistry or working with unsealed radioactive materials

Previous experience in radiochemistry is not a prerequisite. What matters is a robust foundation in preparative inorganic chemistry and the willingness to engage deeply with radiochemical methods. The necessary radiochemical training and hands-on introduction will be provided within the project.

We Offer

- A scientifically ambitious PhD project at the interface of organometallic chemistry, radiochemistry, spectroscopy and theoretical chemistry that breaks new ground in fundamental chemistry
- The opportunity to work with radioactive and highly reactive compounds in a research environment that is extraordinary in this combination
- Access to state-of-the-art infrastructure, including multinuclear NMR spectroscopy at metal nuclei such as ^{99}Tc , and beamline-based X-ray absorption and emission spectroscopy (XAS/XES)
- Close scientific supervision and hands-on training in experimental planning, challenging synthesis, radiochemical techniques, spectroscopy, data interpretation and scientific communication with support for further developing your own scientific ideas
- Professional and personal development through the Karlsruhe House of Young Scientists (KHYS) and the doctoral structures of the KIT Department of Chemistry and Biosciences
- Freedom to develop your own scientific focus within the project objectives and to apply modern computational methods where they provide meaningful scientific value
- Opportunities for national and international networking, conference contributions and publications in international peer-reviewed journals

Framework Conditions

You jointly research challenging modern topics in organometallic and coordination chemistry of the radioactive element technetium together with the junior research group leader Dr. Maximilian Roca Jungfer (further information: rocajungfer.de).

Funding is provided through a direct three-year PhD fellowship (€1,850 monthly fellowship stipend and annual materials allowance of €1,000 in accordance with the funding conditions of the Fonds der Chemischen Industrie, FCI), awarded within the project leader's FCI-funded Liebig Fellowship. The selected candidate is proposed to the FCI by the project leader in accordance with the applicable funding conditions. The fellowship does not constitute an employment relationship.

The research will be carried out at the Institute for Nuclear Waste Disposal (INE) at KIT. The doctorate will be pursued in accordance with the doctoral regulations (*Promotionsordnung*) of the KIT Department of Chemistry and Biosciences. Due to the strongly experimental nature of the project and the use of radiochemical infrastructure at KIT Campus North, regular on-site presence is required; applicants should therefore be able to relocate to the Karlsruhe area.

Application

Please submit your application as a single PDF file (max. size: 10 MB) including:

- Motivation letter (max. 1 page: briefly introduce yourself and explain your motivation for pursuing a PhD. What fascinates you about synthetic inorganic, organometallic and/or radiochemistry in particular?),
- CV (max. 2 pages: including a brief description of your role in previous projects/internships/theses and publication list, if applicable),
- Academic transcripts and degree certificates,
- Contact details of up to two referees, if available; please obtain their consent beforehand.

Application deadline: 30 October 2026, 23:59 CET

Scientific enquiries & applications: Dr Maximilian Roca Jungfer, maximilian.roca-jungfer@partner.kit.edu

Scientific starting point: M. Roca Jungfer, M. J. Ernst, L. Eberle, M. Kesselring, G. Claude, J. Ballmann, *Angew. Chem. Int. Ed.* 2026, DOI: 10.1002/anie.6878935.

We value diversity among our researchers and welcome qualified applications regardless of gender, nationality, ethnic or social background, religion or belief, disability, age, sexual identity, or other personal characteristics.